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point, showing the ways in which it is liable to be disordered; and a statement of the connection between nervous functions and mental processes as thus regarded.

— Captain Armstrong of the British steamship 'Alps' reports to the New York branch Hydrographic Office, Sept. 29, 1887, as follows: 7 A.M., Sept. 23, 1887, off the south coast of Cuba (latitude $19^{\circ} 44'$ north, longitude $74^{\circ} 24'$ west), Cape Guanós bearing N. N. E., distant about 22 miles, felt the shock of a submarine earthquake, lasting about 45 seconds, causing the ship to vibrate fore and aft. At first it appeared as if the valves were thrown open to give an extra shake-up on the engine. 7 miles farther N. E. by N. felt another milder shock, lasting about 7 seconds. 8.10 A. M., about 13 miles from the first disturbance, felt three shocks, lasting about two-thirds of a second, at intervals of about a second. At 8.45 A.M. felt another mild shock, lasting about 2 seconds. The sea was quite smooth, and had been smooth during the night. When the first shock was felt, the sea appeared to rise higher in a solid body (without the least break) for about 3 seconds, and continued smooth after. Light variable winds prevailed, with calms at intervals. Barometer, 30.05; air, 79; water, 84; midnight, barometer, 29.95. The high land of Cuba was enveloped in dark lead-colored clouds, sky from N. E. by E. to S. was quite clear, and several water-spouts were visible in a N. N. E. direction. Noon, after passing Cape Maysi, the weather was clear and fine. By the charts I should think the disturbance occurred in more than one thousand fathoms of water. (Civil time.)

— A correspondent of *Nature* seeks the opinion of psychologists on the following circumstance: A female child, quick and intelligent, when about fifteen months old, learned to repeat the alphabet, shortly afterwards the numerals, days of the week, month, etc., and subsequently scraps of nursery rhymes, English and German, then to spell words of two and three letters. All this was learned readily, eagerly indeed, and for a time she remembered apparently every word acquired, indelibly. At about two years old, further teaching was for a time remitted, as she was observed to be repeating audibly in her sleep what she had learned during the day. Subsequently, tuition was resumed under a governess; but she had not only forgotten much of what she had previously known perfectly, but learns far less readily than formerly. She is now about three and a half years old, in perfect good health and spirits, quick, and particularly observant, but the capacity for learning by rote is materially diminished. She is remarkably imitative, but shows no faculty whatever for writing, and as little for music. The writer would like to hear of any parallel cases, and what the ultimate development has been, with any opinions upon the cause of their appearances.

— At the central station of the United States Fish Commission in Washington may be seen a carload of young trout from Wytheville, Va., for distribution in Maryland, Virginia, and places adjacent to Washington. The collection comprises California trout, lake trout, brook trout, and rock bass. Some handsome specimens of grayling, artificially propagated, are also shown. The young trout have all been hatched artificially and reared at Wytheville. The commission keeps them until they attain a growth of several inches, and then distributes them. A supply of trout will be sent to any person who has on his place suitable waters, and facilities to insure proper protection for the fish. A dozen young trout are sufficient to stock an ordinary pond or lake, and one hundred to stock a running stream. The fish should not be molested for at least three years, until they have had an opportunity to spawn twice. The commission will send a carload of young carp and other fish to the Kansas City Exposition in a few days. The car will remain there a few days, affording opportunity to visitors to the exposition to inspect the methods of fish-distribution. Some of the young carp will be distributed from that point, and the car will then proceed on a trip, for distribution purposes, to the South-west. It is proposed to use one of the breeding-ponds in Washington next year for raising shad. Colonel MacDonald says that a million shad could be raised to such a size, in one of these ponds, as to insure the return to the Potomac of at least two hundred and fifty thousand shad of full growth. The young shad will then be turned out into the Potomac.

— The opening address of Col. Sir Charles Warren, president of the Geographical Section of the British Association for the Advancement of Science, deals with the much-discussed subject of the teaching of geography. The views expressed in this address are of interest, as the author opposes the new methods advocated by the Royal Geographical Society, and declares that they will lead to evil results. "It seems now to be desired to promote the acquirement of knowledge at the earliest age without effort and without hard work; but this appears to be directed towards alleviating the toils of the instructor as much as the instructed; and we have now, as a result, children taught common things without any effort to strengthen their memories, and then a system of cramming introduced at a later period, when the memory has ceased to be capable of responding to the efforts made. . . . It seems to me that the remedy recently adopted is worse than the disease it was to eradicate, and that, however injurious it was to attempt to store the mind with mere names, yet the memory was trained thereby to retain something definite; and it is still worse to attempt to store the mind with mere ideas without the connection of names, and leave the memory to rust. There is obviously a middle course which may rid us of the errors of the past without leading us into still greater difficulties; and if we keep the object to be gained always in view, we cannot fail to take a direct line. We want first to lead the memory to constant exertion of such nature that it grows stronger day by day, but is not overstrained or wearied; at the same time it must be stored with useful facts, which may be quite above the capacity of the mind to comprehend at the time, but which will be required all through life: this can readily be done by means of verses or rhymes set to simple airs and committed to memory by song." As these views are expressed from so prominent a place, they require some comment. In another passage of his address, Colonel Warren says, that, in consequence of the progress of science, we are fast losing our human nature, and are becoming machines, and we call it becoming civilized; that we are drifting into a condition in which we learn nothing of ourselves or by our own individual efforts. This is exactly what educationists complain about, and the reason why they demand a method of teaching which develops the mental powers. But this aim will not be reached by memorizing rhymes containing uncomprehended and incomprehensible facts. It is a misinterpretation of the method recently advocated by geographers, if Warren says that it is only directed to alleviate the toils of the teacher and of the pupil. It requires much careful preparation on the part of the teacher to represent facts to the untrained mind of a child so that they will be intelligible, and it requires the utmost exertion of the attention, memory, and the faculties of observation of the child, to meet the demands of the teacher. The remarks of Colonel Warren on the desirability of an efficient teaching of geography will be generally accepted, but there is not much difference between the memorizing which is still practised in most schools and the methods he proposes.

LETTERS TO THE EDITOR.

* * The attention of scientific men is called to the advantages of the correspondence columns of SCIENCE for placing promptly on record brief preliminary notices of their investigations. Twenty copies of the number containing his communication will be furnished free to any correspondent on request.

The editor will be glad to publish any queries consonant with the character of the journal.

Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.

Over-Pressure in the Schools.

WHEN we ask whether over-pressure in the schools is a fact, we receive answers ranging all the way from the most positive affirmatives to the most positive negatives. In fact, it is one of the 'burning' educational questions of the times. There now lie before me two paragraphs cut from the same number of an educational journal, that speak the two voices. In one, Dr. W. A. Hammond of New York tells the story of a little girl brought to him from school affected with St.-Vitus's-dance, in whose book-bag were an English grammar, an arithmetic, a geography, a history of the United States, an astronomy, a physiology, a French reader, a French grammar, and a treatise on general science. The doctor says the little girl had learned all these things, but had done so at the expense of her brain capital, not of her brain income. Intellectual bank-

ruptcy was staring her in the face. He appears to think that this is a typical case, and concludes that we are living too much under the rule of the school-master. The other voice is spoken by Miss Mary E. Yate, principal of one of the New York schools. She has never heard of a child that was injured by the school system. Other causes hurt young people: the dissipations of child-life kills tens of thousands where study kills one. Too much candy, late parties, church sociables, story-reading at night, etc., are the real causes of ills attributed to over-study. Now, where does the truth lie?

First, if the little girls of the country are swinging to and from school book-bags filled as Dr. Hammond says he found one filled, teachers cannot plead social dissipation and candy as the cause of their failing health. If this is a typical book-bag, then the course of study is overcrowded, and too much work is demanded by the schools. But this is not a typical book-bag, and we may set it aside in seeking an answer to our general questions. No doubt such book-bags can be found; no doubt there is great over-pressure in some towns and cities; perhaps the average course is too full: but the little girls of the country are not carrying on at one time all the studies represented in that fateful book-bag.

Second, as a class, the physicians of the country are disposed to take the ground taken by Dr. Hammond: as a class, the teachers of the country tend to side with Miss Yate. Such are the two opposite tendencies, and I do not for the moment attempt to decide between them. But it is important to observe that the physician and the teacher alike are each pretty sure to exclude certain important elements from the problem. The physician, seeing that the school is a very prominent, perhaps the most prominent, factor in a child's life, is apt to charge to the school ills that spring from some other cause, or that spring from the school together with other causes; while the teacher, disposed to magnify his office, and to think that school-education should be the main pursuit of childhood and youth, is apt to overlook other demands, and necessary demands, that are made upon the child's time and energy. The result is, that neither the doctor nor the teacher deals with a whole child; the two divide the child between them: whereas the doctor and the teacher should each treat the child as a whole or unit, — body and mind, home and school, work and play, — and deal with him accordingly. There are teachers who need to be reminded that they cannot absorb, and ought not to absorb, a child's time and life over and above sleeping, eating, and dressing. There are many necessary child activities that fall outside the school, although wise parents will see that these are kept within due limits. The school-master is certainly abroad, and in a sense perhaps too much abroad.

Passing to the main question, over-pressure in the schools is a fact to the same degree that over-pressure in other departments of American life is a fact. Here I see no reason to throw aside or modify the conclusion that I came to three or four years ago, of which this is the substance. Our inherited Saxon push, our national environment, our boundless opportunities, and our free institutions, in respect to courage, audacity, enterprise, and many forms of achievement, make us a people by ourselves. It would be hard to name a field of life in which our energy, impatience, and nervousness do not show themselves. It is notorious that the average American does more work, whether physical or mental, than any other average man in the world: hence it is that America is the gauge for measuring the most energetic communities of the Old World; as when Lancashire, England, is called 'America and water.' The words in which Mr. Herbert Spencer spoke of the injury done by our high-pressure life, at the dinner given him in New York four or five years ago, will not soon be forgotten. History has charged a good deal to the American spirit, and credited it with much more. Its worst effects, unfortunately, are seen in the higher fields of effort, — science, literature, education, and art, — where time is an all-important factor. The tension of the public schools is too high in the sense that the tension of our business and social life is too high: in other words, the schools partake of the national genius. Dr. Stanley Hall, some years ago, said he had seen a file of one hundred and fifty small German boys just as they marched out of the school-house at noon a quarter of a mile away; also that he had observed that the little girls at the Victoria school, Berlin, did not run a step at recess, or do any thing that an equal

number of ladies might not do. But such things as these, it hardly need be said, cannot be found in the typical American school.

The foregoing remarks have been made with almost sole reference to our public-school education considered as a whole; but they can be extended with hardly a word of qualification to our higher education, professional education, and technical education considered in the same way. While we have much in these departments of which we may well be proud, we also have much that we must excuse or altogether abandon without defence. The causes of this state of things are the restlessness and impatience of the national character: its conditions are the external facts of American life, and particularly in those communities that are less than one hundred years old. Nothing but more maturity and the established ways of an older and more orderly society, where constant forces work with more steadiness, and chance plays a less part than hitherto in success, can remedy these evils.

My answer to the question whether over-pressure in the schools is a fact, is broad and general, taking no account of a considerable number of facts that are at variance with it, and that of themselves would refute it. For example: I can name a city where the principle of emulation is greatly overstrained; the scholars of a particular class, the classes of a particular building, and all the buildings of the city, are engaged in an unending competition for 'marks;' the teachers cram the children with lessons, and the newspapers cram the people with tables of percentages; and the public seem rather to enjoy it. Such facts as these are very important in their way, but do not call for a modification of the judgment presented above. They prove that school tension is sometimes in excess of the amount found in common life.

From the premises now presented, some important conclusions follow. Speaking broadly, as before, the teachers of the public schools are not responsible for such over-pressure as exists. They show the traits of the national character; they magnify their office; they are open to severe censure in numerous individual cases; but their courses of study and their methods of instruction, they have invented to meet the popular demand. To be sure, the impression is common that teachers go counter to the wishes of parents when they hurry children through school; but the fact is, the average teacher is not so anxious to hurry the child as the average parent is to have him hurried. This proposition cannot be proved by statistics, but it will be indorsed by the sensible school superintendents of the country. The rank of their children in the classification, their position in the school, their promotion from grade to grade, — these are with numerous school-patrons a passion.

Another conclusion is, that the evils which exist cannot, for the most part, be remedied by reading school-teachers sharp lectures. The fundamental trouble is with the public; and it is simply the educational outcropping of the national genius, push, hurry, impatience. Of course, the wrong-doing of particular teachers can be corrected by criticism, or the faults of a system of city schools may be remedied by discussion; but the over-tension of the schools of the country can be fully relieved only by a toning-down of the national life, and this must come about mainly of itself. So far as discussion is concerned, the most important thing that can be done is this: to impress the public with the facts that time is an all-important element in education, and that knowledge, and, still more, mental faculties, grow, and are not made. Pressure can never take the place of time. Warmth is essential to the maturing of the peach, but the fruit-grower will not promote the process by building a fire on the roots of the tree. It is very desirable to get some of the present self-consciousness out of the lives of young children. And then, how desirable it is that boys and girls go to the high school with a full year more of life and strength behind them!

Finally, perhaps the most serious and common fault of teachers is the tendency to fuss and worry. Teachers worry more children to death than they work to death. Fretting, an excess of 'order,' an overdoing of 'position,' do more harm than books and lessons. The topic runs into moral training where we cannot follow it. But sound digestion, strong nerves, a good appetite, sleep, that "knits up the ravelled sleeve of care," good temper, self-command, cheerful confidence, and a young spirit, are important elements in moral

training; what is more, they are not properly appreciated. Not one man in a thousand knows the amount of harm that is done to young children by placing them under the tuition of testy, irritable, explosive, and neurotic teachers.

B. A. HINSDALE.

Cleveland, O., Oct. 3.

Objects in Teaching.

THE value of objects in giving correct ideas, was brought forcibly to my mind not long since while teaching a class in natural philosophy at the New York State Institution for the Blind, Batavia, N.Y.

It was my custom to place before them, the day before its uses and the principles which it illustrated were to be discussed, a given piece of apparatus, that, by becoming familiar with the form and construction, its application might the more readily be appreciated. One of the class, a young man blind from infancy, with a fondness for machinery of all kinds and a quick perception of the use of such as was placed before him, would frequently study the lesson in advance, picturing to himself as carefully as possible the apparatus described. These pictures, as he told me afterwards, were far from correct.

The thorough examination and understanding of each succeeding object, of whatever kind, add so much to the stock of correct concepts, which is valuable not only for itself, but for its aid by comparison in understanding others.

One of our most successful teachers described to her class, ranging in age from eight to twelve, as vividly as she could without naming it, a ladder. Among other things, she stated that it was made of wood, had parallel sides, etc., using such terms as would seem to be most readily understood, and then asked for the name of the thing described. For some time no one could tell: various things were mentioned, one boy suggesting 'map,' the maps for the blind being cut in relief from wood, with the sides of the frame parallel.

A little girl had for the first time a bird, a stuffed specimen, placed in her hands, and was much surprised to find that it had but two legs, having supposed until then that birds had four.

Whatever may be said for or against object-teaching for seeing children, that of blind children is successful proportionately as it is objective.

J. T. MOREY.

Perkins Institution, South Boston, Mass., Oct. 3.

Color-Blindness.

IN the opening article in *Science* last week (Sept. 30) an idea was suggested, or recalled, that may be of value; and I offer it in view of the possible value. I have observed for twenty years or more a difference in the power of my two eyes, at times, to discriminate in light reds when viewed at a distance of fifty feet or more; and I think this difference in the visual power of the two organs depends very largely, if not altogether, on the way in which the eyes are used. If I have been occupied with work that called one eye into active exercise, where the mind was occupied in discussing the surface or object viewed, particularly if the light was variable, then I find persons appear different, according to which eye is used. Not only so, but the two eyes do not focus the same; the image, with the tired eye, being farther off than that from the eye that is rested, and of a dull gray color. If I go to a lecture under such circumstances, there appear to be two lecturers,—one pale and shadowy behind; and above, the other, which seems, perhaps by contrast, to take on a brighter hue. Under such circumstances, I close the tired eye,—as I have come to consider it,—and give it a rest, or go out into the fields and give it a feast on green. Now, may not the eyes of engineers vary as to visual power in the discrimination of colors with excessive use? If both eyes are exhausted and need rest, the individual would not be able to detect his own disability. Now, if that is so, it is of importance to the public that no one should be on duty for a great length of time, where the safety of any depend on the discriminating power of the eyes as to colors.

And would it not be well, in testing eyes, to note the condition of the individual,—whether fresh or tired, just from work or just from rest?

GEO. F. WATERS.

Boston, Oct. 3.

Percentage of Ash in Human Bones of Different Ages.

REFERRING to Watt's 'Dictionary of Chemistry,' under the article 'Bone,' we find two tables of analyses of bones,—one by Von Bibra, and the other by Frémy. These two scientists do not arrive at the same conclusion. Von Bibra states that "the portion of inorganic matter in bone is smaller in youth than in age, although no regular gradation can be observed;" while Frémy holds that "the bone of a foetus was found to yield the same quantity of ash as that of a woman of ninety-seven years of age." Although the actual number of analyses made by these investigators was large, yet simple inspection of their tables will show that very few were made of the same bone in each case; and it is evident that a comparison between a femur on the one hand, and a tibia on the other, could not be trustworthy.

It occurred to me as worth while to supplement their lists; and I here present what may be considered a report of progress in that direction, very much yet remaining to be done.

The extreme difficulty of getting supplied with material the history of which is both certain and satisfactory renders the work exceedingly slow.

The bone for examination was in every instance cut from the dense portion of the shaft of the femur. No subject was taken who had, so far as known, suffered from rickets or other serious bone-disease, and women of recent confinement were also excluded. All specimens were obtained either from living persons (amputations) or those recently dead. After crushing in a steel mortar, extracting with ether, and again crushing, the ash was determined by incineration in a platinum dish. The results are in the appended table.

No.	Sex.	Color.	Nationality.	Occupation.	Died of.	Age in years.	Per Cent of Ash.	Remarks.
1	Specimen	men	lost.					
2	Male	White	"	"	Phthisis	65	67.05	
3	"	Negro	"	"	"	21	65.89	Had scrofula
4	"	White	Russian	Sailor	"	23	67.28	Had syphilis
5	"	"	American	Farmer	"	33	67.63	Amputation
6	Female	"	Irish	Actress	Peritonitis	23	67.66	
7	Male	"	"	"	Phthisis	60	67.55	
8	Female	"	Irish	"	"	24	68.29	
9	Male	"	"	"	"	57	67.73	
10	"	"	"	"	"	58	67.60	
11	"	"	"	"	"	57	68.82	[bowel-disease
12	Female	Negro	"	"	?	25	68.20	Died of some
13	Male	White	Irish	Laborer	Killed	21	67.73	
14	"	"	English	Brewer	"	31	66.51	Amputation
15	"	"	Irish	"	"	8	64.86	"
16	Female	"	"	Domestic	Phthisis	46	69.67	Married
17	"	"	French	"	Peritonitis	57	67.60	"
18	Male	"	American	Farmer	Old age	81	68.56	"
19	Female	"	Irish	"	Apoplexy	60	69.33	Married
20	Male	"	"	Laborer	Bronchitis	74	68.72	"
21	Female	"	American	"	Phthisis	44	68.30	Married
22	"	"	Irish	"	"	60	67.93	Insane.
23	Male	"	German	"	?	40	69.28	"
24	"	"	"	"	?	53	68.23	"
25	"	"	Irish	"	Phthisis	56	68.94	"
26	"	"	"	"	Bright's disease	41	68.15	"
27	"	"	"	Laborer	Dysentery	48	69.73	"
28	Female	"	American	"	Phthisis	29	69.18	"
29	"	"	"	"	"	34	69.82	"
30	Male	"	Italian	Laborer	Tetanus	29	68.47	Effect of wound
31	Female	"	American	Domestic	Typhus-fever	24	67.99	"
32	Male	"	"	"	Nephritis	49	69.35	"
33	"	"	"	"	Alcoholism	58	68.69	"
34	"	"	Irish	"	"	11	65.87	Amputation
35	"	"	German	"	Phthisis	59	68.93	"
36	Female	"	Irish	"	"	29	69.03	"
37	Male	"	"	"	Pneumonia	55	69.72	"
38	"	Negro	"	"	Phthisis	45	69.06	"
39	"	White	German	Brewer	?	40	69.31	"
40	"	"	English	Tailor	?	73	69.85	"
41	"	"	Irish	Laborer	Killed	38	69.05	"
42	"	"	"	None	Phthisis	25	69.36	Drunkard
43	"	"	American	Hostler	Alcoholism	63	68.07	"
44	"	"	English	Coachman	"	43	65.11	Had syphilis
45	"	"	"	Shoemaker	"	45	65.16	Drunkard
46	"	"	"	Lawyer	Old age	70	62.82	"
47	Female	"	"	Prostitute	Phthisis	26	65.23	"
48	"	"	"	Domestic	"	31	65.61	Bone very brittle
49	Male	"	German	Shoemaker	"	38	63.98	"
50	"	"	Irish	Laborer	?	61	63.54	"

I think enough has been done to show that the common belief in the increased brittleness of bone with advancing years being due to increased percentage of inorganic salts, is without foundation. The appended table indicates that after manhood is reached, no variation in quantity of ash takes place as the years roll on.

"The greater brittleness of the bones in age is attributed by